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Individual differences in prophetic dream belief and experience

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Abstract

A large proportion of the general population believes that dreams can provide information about future events that could not have been obtained by any known means. The present study identifies several factors associated with prophetic (precognitive) dream belief and experience. Participants (*N* = 672) were measured on demographic variables, sleep characteristics, and precognitive dream (PD) belief, experience, and frequency. Three 'sleep clusters' were identified based on the analysis of the sleep-related variables. Women were more likely to believe in PDs as well as experience them. There was a positive relationship of PD belief and experience with age and a negative one with education. Most notably, we found that a high frequency of PD experiences was associated with erratic sleep patterns and sleep medication use. The present study provides a basis for the development of further models explaining the prevalent phenomena of precognitive dream belief and experience.

Keywords: individual differences; paranormal belief; precognitive dreams; sleep characteristics.

1. Introduction

Recent surveys show that a large proportion of the population believes that dreams can literally provide information about future events that could not have been obtained by any known means (*e.g.*, rational inference, intuition) and is not merely coincidental. The belief in the reality of these so-called precognitive dreams (PD) was espoused by around 55-70% of participants in three representative samples of Britons, Icelanders, and Swedes, with about half as many reporting having had such a dream (Haraldsson, 1985). Given the high prevalence of PD belief and experience coupled with the inconsistent findings from controlled tests of dream precognition (e.g., Watt, Wiseman, & Vuillaume, in press), it is important to investigate potential psychological factors that may account for these phenomena. The present study identifies several such factors.

Haraldsson (1985) found that women were more likely to both believe in the reality of PD and report having experienced them. Others, however, did not find such differences (Rattet & Bursik, 2001; Schredl, 2009). The present study will look at the relationship between gender and other demographic variables that have yielded similarly mixed findings (age, Haraldsson, 1985; Schredl, 2009; and education, see French & Stone, 2014) and PD belief and experience.

Some authors have considered various cognitive factors that might contribute to the misattribution of normal experiences as 'paranormal' (for a review, see Wiseman & Watt, 2006). Concerning PDs, these include implicit processing of subtle cues from the environment (Valášek, *et al.,* 2014), selective recall and propensity to perceive correspondences between randomly-paired stimuli (Watt, Ashley, Gillett, Halewood, & Hanson, 2014), and the incorporation of unconsciously perceived environmental stimuli into dreams (Watt *et al.*, in press). For example, if a person falls asleep within earshot of the television, a news item may get incorporated into the narrative of their dreams. When they later learn the news, they can think that their dream foretold the event in question (Alcock, 1981). Furthermore, both early and late sleep stages have been shown to be permeable to external stimuli (Hoelscher, Klinger, & Barta, 1981), so it is plausible that the more often one enters borderline sleep states, the higher the likelihood of putatively PD experiences will be. This study therefore examines the relationship between precognitive dream experience and various patterns of sleep-related behaviours (nap-taking, nocturnal wake-ups, dream recall and overall subjective sleep quality).

Closely related to the aforementioned topic is the issue of sleep medication use. Use of medication alters sleep patterns and certain drugs have been shown to interfere with REM sleep (Pagel & Parnes, 2001) as well as induce nightmares (Pagel & Helfter, 2003). This could affect both dream recall and the frequency of borderline sleep states. We thus include a measure of sleep medication use to explore its potential effects on PD experience.

To summarise, given the mixed results of the reviewed research, the study will firstly investigate the role of demographic variables: we hypothesise an effect of gender (H1), age (H2), and education (H3) on the belief in and experience of PDs. Secondly, based on the argument outlined above, we expect to find a relationship between individuals' patterns of sleep related behaviour characterised by sleep quality, frequency of nocturnal awakening and diurnal naps, and dream recall and subjective PD experience (H4). And finally, the study will explore the relationship between sleep medication use and the experience of PDs (H5). Given the conflicting findings in the literature related to demographic characteristics as well as the exploratory nature of this study due to a lack of research on sleep behaviour and PDs, all the hypotheses stated above are non-directional.

2. Method

2.1. Participants

Participants were primarily recruited via online social networks and interest groups dedicated to various topics (psychology, dreams, scepticism, the paranormal). A total of 693 participants completed the study. Ten participants were younger than 18 years and were excluded from further analysis. Of the remaining participants, 279 were male (41.52%) and 393 (58.48%) female. Eleven participants (1.6%) did not identify as either, and their exclusion resulted in the final sample of 672 participants (M_{age} = 31.47 years, range = 18-75, SD = 11.74). There was no age difference between genders (M_{male} = 31.45, SD = 12.67, M_{female} = 31.48, SD = 11.05, t (546.21) = 0.032, p = .974).

2.2. Materials

A battery of questionnaires was administered in the following order. The wording of the items can be found in the supplement.

2.2.1. Demographic data

Standard demographic items including gender (including an additional non-binary response option), country of origin, age, and years of formal education completed were taken.

2.2.2. Sleep characteristics

Seven items related to sleep quality addressing usual sleep duration, frequency of day-time naps and night-time wake-ups, use of sleep medication, history of sleep disorders, usual dream recall, and overall subjective sleep quality were used. The items were adapted from the Pittsburg Sleep Quality Index (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989).

2.2.3. Precognitive dream belief and experiences

Belief in PDs was assessed using a 4-item Likert scale with response options ranging from 1 (*Completely disagree*) to 7 (*Completely agree*). Internal consistency of this scale was high, $\alpha = .92$.

PD experience was measured using two further items. The first was also a 7-point Likert item worded “I have had at least one dream that came true and which (I believe) was precognitive.” The second item related to PD frequency (“Approximately how often you have had a precognitive dream over the last few years?”) was included in the battery. PDs were defined as “dreams that foretell the future” and Bender’s (1966) criteria for what constitutes a PD were included before the precognitive dream section of the questionnaire battery.

2.3. Procedure

The study was approved by [a UK university] Research Ethics Board. The battery of questionnaires was administered online. Participants read a description of the study and gave consent by proceeding with filling in the questionnaire. Upon completion, participants were thanked and debriefed. All analyses were conducted using the R software version 2.15.3 (R Core Team, 2012).

3. Results

3.1. Descriptive analysis

The mean number of completed years of formal education was 16.45 (*Mdn* = 17, *SD* = 3.35, range = 8-25). The majority of participants reported sleeping on average 7-8 hours a day (62.7%) with only 4.5% of participants sleeping fewer than 5 or more than 10 hours a day. The mean overall sleep quality, rated on a 7-point Likert scale from 1 (*Very bad*) to 7 (*Very* *good*), was 5.1 (*Mdn* = 5, *MAD*[1] = 1.48). Forty-two participants (6.9%) reported having been diagnosed with a sleep disorder. Items related to frequencies of daytime naps, night time waking up, use of sleep medication and dream recall are summarised in Table 1. Due to extremely skewed distribution of responses to the sleep medication item (80.1% reported no use), we dichotomised the variable for further analysis.

Table 1

Descriptive statistics for sleep variables

Variable	*Mdn*	Min	Max
Daytime nap frequency	2	0	6
Night time wake-up frequency	3	0	6
Sleep medication use frequency	0	0	6
Dream recall frequency	4	0	7

The mean score on the PD belief, derived from the four items measuring belief in the reality of PDs, was 3.5 (*Mdn* = 3.5, *SD* = 2.01). The median response to the item addressing PD experience was 2, with 39.2% of the sample having scored above the mid-point. Furthermore, 56.2% of participants reported no PD experience, 17.8% reported having PDs less often than once a year, 6.2% about once a year, 12.1% about once in six months, 5.2% reported having PDs about once a month, and 2.5% about once a week. Belief in PDs was strongly related to both PD experience (r_s = .812, 95% CI* [.780, .841], $p < 2 \times 10^{-16}$) and frequency (r_s = .730, 95% CI* [.692, .764], $p < 2 \times 10^{-16}$).

[1] Median absolute deviation.

3.2. Hypothesis testing

3.2.1. Demographic variables and PD belief and experience

First, we explored the role of demographic variables in PD belief and experience (H1). A multiple linear regression predicting PD belief with gender, age and years of formal education was conducted[2] to assess the individual contributions of the predictor variables. The model accounted for 22.5% of the variance in precognitive dream experience, with all variables having a significant effect on PD belief (Table 2). This result was supportive of H1, H2, and H3: men exhibited lower PD belief, while age was positively related to the outcome variable. Furthermore, PD belief diminished with increasing number of years of formal education completed. Comparable results were obtained from a multiple ordinal regression of PD experience on the same predictor variables (see Table S1).

Table 2

Summary of the multiple linear regression model predicting PD belief

Predictor	*b*	β [95% CI*]	*t*	*p*
Gender	−0.449	−0.109 [−0.174, −0.039]	−3.203	.001
Age	0.072	0.416 [0.350, 0.475]	12.169	$< 2 \times 10^{-16}$
Education	−0.139	−0.230 [−0.291, −0.162]	−6.745	3×10^{-11}

In order to explore the effect of demographic variables on the unique variance of PD belief and PD experience respectively, we added each variable in the model predicting the other. This resulted in age being the only significant predictor of PD belief, $b = 0.029$, $SE = 0.004$, $\beta = 0.047$, 95% CI* [0.033, 0.062], $p = 2 \times 10^{-12}$, $\Delta R^2 = .022$, and education being the

[2] Predictors were added simultaneously in all regression models reported in this paper.

only significant predictor of PD experience, $b = -0.088$, $SE = 0.027$, OR = 0.92, 95% CI [0.87, 0.96], $p < .001$.

3.2.2. PD frequency and sleep characteristics

To ascertain the relationship between PD experience and sleep characteristics (H3), a hierarchical cluster analysis using Ward's minimum variance method (Ward, 1963) was first conducted on the five standardised sleep variables (sleep duration, frequency of nocturnal awakenings and diurnal naps, dream recall frequency, and subjective overall sleep quality). Due to extremely small variance of the sleep medication variable as well as the binary nature of the sleep disorder variable, these were excluded from the cluster-analysed set. The aim of this analysis was to identify different sleep patterns in the sample. Three clusters of similar sizes were identified. The individual "sleep profiles" of these clusters are depicted in Fig. 1. Cluster 1 was characterised by an erratic sleep pattern with high frequency of both nocturnal awakenings and diurnal naps, high dream recall and a low subjective overall sleep quality. Cluster 2 differed from Cluster 3 most markedly in terms of sleep duration and dream recall. Thus, these two clusters were interpreted as representing high and low dream recallers respectively. Table 3 shows the descriptive statistics for the measured variables with respect to the three sleep clusters as well as tests of differences between the clusters. There were no significant differences between the sizes of the clusters, χ^2 (2) = 3.723, $p = .155$, however, there was a preponderance of men in Cluster 3 compared to Cluster 2, χ^2 (2) = 7.790, $p = .020$. The mean age of Cluster 1 was furthermore significantly higher in comparison to the other two clusters, Mean $\text{diff}_{2-1} = -3.29$, 95% CI* [−5.90, −0.69], p = 0.009; Mean $\text{diff}_{3-1} = -4.37$, 95% CI* [−7.00, −1.74], $p = 3 \times 10^{-4}$. Importantly, the three clusters also differed significantly from one another in the proportion of participants who have used sleep medication, with Cluster 1 having the highest and Cluster 3 the lowest proportion, χ^2 (2) = 28.396, $p = 7 \times 10^{-7}$. To see if this relationship remained significant after controlling for age, the variables were entered into a logistic regression with age and sleep clusters as predictors and sleep medication use as a binary outcome. As shown in Table 4, participants in Cluster 2 were 58% less likely to have used sleep medication than Cluster 1 participants. Those in Cluster 3 were 67% less likely to report sleep medication use compared to Cluster 1. However, there was no significant difference between Clusters 2 and 3 (Table S2).

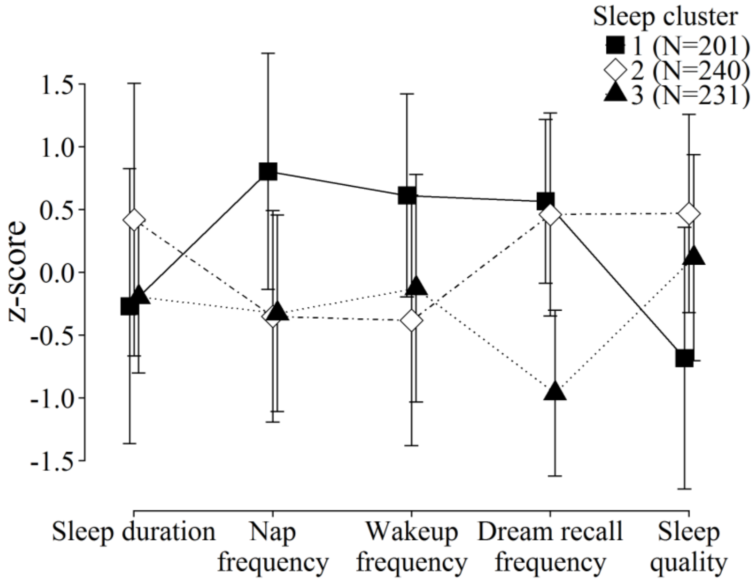

Figure1. Sleep variable profiles of three identified sleep clusters. Error bars represent ± 1 *SD*.

Next, we investigated the relationship between sleep patterns and PD frequency. As reported in Table 3, there was a significant difference in PD frequency between each pair of sleep clusters. Table 5 shows a more detailed breakdown of proportion of responses on the PD frequency item within individual clusters.

Table 3

Descriptive statistics and test of between group differences for measured variables with respect to sleep clusters

Variable	Cluster 1	Cluster 2	Cluster 3	χ^2 (2)

N (%)	201 (29.9)	240 (35.7)	231 (34.4)	3.723
Gender (% male)	42.3	35.0^{3}	47.6^{2}	7.790*
Sleep meds (% use)	32.3^{2,3}	16.3^{1,3}	13.0^{1,2}	28.396***
Sleep disorder (%)	11.00^{2,3}	4.6^{1}	4.3^{1}	9.910**
	M (SD)	*M (SD)*	*M (SD)*	*F* (2,669)
Age	34.14 (13.22)^{2,3}	30.85 (11.02)^{1}	29.77 (10.7)^{1}	8.125***
Years of education	16.31 (3.39)	16.39 (3.47)	16.64 (3.20)	0.564
PD belief	4.17 (2.02)^{3}	3.76 (2.05)^{3}	3.27 (1.90)^{1,2}	10.990***
	Mdn (MAD)	*Mdn (MAD)*	*Mdn (MAD)*	*H* (2)†
Sleep duration	3 (0.00)^{2}	3 (0.00)^{3}	3 (0.00)^{1,2}	65.313***
Nap frequency	5 (1.48)^{2,3}	2 (1.48)^{1}	2 (1.48)^{1}	168.269***
Wakeup frequency	6 (1.48)^{2,3}	4 (2.97)^{1,3}	4 (2.97)^{1,2}	114.984***
Dream recall	6 (1.48)^{3}	6 (1.48)^{3}	4 (1.48)^{1,2}	333.306***
Sleep quality	4 (1.48)^{2,3}	6 (1.48)^{1,3}	5 (1.48)^{1,2}	139.745***
PD experience	5 (2.97)^{2,3}	3 (2.97)^{1}	2 (1.48)^{1}	25.631***
PD frequency	2 (1.48)^{2,3}	1 (0.00)^{1,3}	1 (0.00)^{1,2}	40.407***

Note. Superscripts in individual cells indicate a significant difference from given cluster according to Tukey HSD-corrected *t*-test for continuous variables and Bonferroni corrected Mann-Whitney *U*-test for ordinal variables.
† Kruskal-Wallis ANOVA due to ordinal variable.
* < .05; ** < .01; *** < .001

Table 4

Summary of logistic regression predicting sleep medication use

Predictor	*b*	*SE*	*p*	OR [95% CI]
Age	0.012	0.01	.118	1.01 [1.00, 1.03]
Cluster 2	−0.862	0.23	2×10^{-4}	0.42 [0.27, 0.66]

Cluster 3	−1.112	0.25	8×10^{-6}	0.33 [0.20, 0.53]

Table 5

Proportion of PD frequency levels by sleep clusters and sleep medication use categories

	PD frequency (%)					
Sleep cluster	0	1	2	3	4	5
1	36.82	19.40	7.46	20.90	9.45	5.97
2	51.88	16.74	3.77	14.23	8.79	4.60
3	62.77	18.61	8.66	7.36	1.73	0.87
Sleep medication use						
No	54.56	17.69	6.7	12.1	5.77	3.17
Yes	37.31	20.15	5.97	20.9	9.7	5.97

Note. Columns within rows add up to 100%.

In order to control for demographic variables, a multiple ordinal regression model was fit with PD frequency as outcome and demographic variables and sleep cluster as predictors. The results are summarised in Table 6. Sleep cluster remained a significant predictor even after accounting for the significant effects of age and education. Furthermore, there was also a significant difference between Clusters 2 and 3, b = 0.580, SE= 0.19, p = .002, OR = 1.79, 95% CI [1.24, 2.58] (Table S3).

The relationship between the presence of a sleep disorder diagnosis and PD frequency was investigated using another multiple ordinal regression with a categorised PD frequency (“Never”, “Once a year or less often”, “More often than once a year”) as outcome variable. The reason for this treatment of the variable was the small number of participants who reported having been diagnosed with a sleep disorder. Reducing the number of outcome variable categories thus increases the number of cases per cell. Sleep disorder was a significant predictor of PD frequency category, even after accounting for the effects of demographic variables and sleep cluster, $b = 0.752$, SE= 0.33, $p = .021$, OR = 2.12, 95% CI [1.12, 4.04]. This result provides further support for H4 that sleep patterns are related to experience of precognitive dreams.

Table 6 *Summary of ordinal regression of demographic variables, sleep cluster and sleep medication use on PD frequency*

Predictor	*b*	*SE*	*p*	OR [95% CI]
Gender	−0.169	0.16	.279	0.84 [0.62, 1.15]
Age	0.041	0.01	2×10^{-11}	1.04 [1.03, 1.06]
Education	−0.163	0.02	10^{-12}	0.85 [0.81, 0.89]
Cluster 2	−0.393	0.18	.033	0.68 [0.47, 0.97]
Cluster 3	−0.973	0.19	4×10^{-7}	0.38 [0.26, 0.55]
Sleep meds	0.446	0.19	.016	1.56 [1.08, 2.24]

3.2.3. PD frequency and sleep medication

Finally, we investigated the role of sleep medication in PD experience (H5). Firstly, we compared the distributions of responses on the PD frequency variable between those who reported having used sleep medication and those who did not. The distributions differed significantly, χ^2 (5) = 17.454, $p = .003$. Table 5 shows the proportions of responses within the individual sleep medication use groups.

Secondly, we controlled for the effects of demographic variables and sleep cluster by including them, along with the binary sleep medication variable into a multiple ordinal regression with PD frequency included in the model as outcome. As shown in Table 6, the effect of sleep medication, as well as sleep cluster, on PD frequency remained significant. This result was consistent with H5.

4. Discussion

The present study investigated the relationships between belief in, and experience of, putatively precognitive dreams and various demographic and sleep-related variables. Five hypotheses were tested.

The first three hypotheses postulated a relationship between gender, age, and years of completed formal education on the one hand and PD belief and experience on the other. Consistent with previous literature (Haraldsson, 1985), women were more likely to believe in the reality of PDs as well as to report a first-hand experience of them than men. Furthermore, contrary to some previous findings (Schredl, 2009), both PD belief and experience were positively related to age. It could be argued that a longer life means a greater chance of having a subjectively precognitive dream and thus a greater likelihood of espousing PD belief. However, this interpretation does not account for the positive relationship between age and reported PD frequency, unless this kind of self-report is at least partly driven by belief. Since attitudes have been shown to inflate self-reported dream recall frequency (Beaulieu-Prévost, & Zadra, 2005), this is certainly a possibility. Further research should address this issue. We also found that the number of completed years of education was negatively related to both PD belief and experience. However, when predicting only the variance not shared between PD belief and experience, gender and education were not related to the former, while gender and age were not predictive of the latter. This suggests that the detected gender differences lie in the overlap of PD belief and experience, while age is primarily related to PD belief and education primarily to PD experience. These findings demonstrate the value of treating paranormal belief and experience as separate constructs with their own respective underlying factors.

In the light of the cognitive deficit hypothesis of paranormal belief (Alcock, 1981), the relationship between education and PD experience may be taken to suggest that more educated people are more likely to scrutinise their experiences. This is certainly plausible; cognitive ability has been shown to correlate positively to critical thinking and negatively to biases in probability judgement (Liberali, Reyna, Furlan, Stein, & Pardo, 2012; West, Toplak, & Stanovich, 2008; but see Stanovich & West, 2008) and education has been shown to correlate with general cognitive ability (Ritchie, Bates, Der, Starr, & Deary 2013). On the other hand, using formal education as a proxy for cognitive/critical thinking ability is potentially problematic (Deary & Johnson, 2010). Therefore this result should be treated with caution when used as support for the cognitive deficit hypothesis. It nevertheless provides a good basis and rationale for future research using more direct measures of cognitive ability and critical thinking. Future investigation of the relationship between these variables and specific paranormal experiences may help to resolve the inconclusive results obtained from studying the conceptually ill-differentiated composite of general paranormal belief and experience (French & Wilson, 2007).

We also hypothesised a relationship between the frequency of PD experience and patterns of sleep-related behaviour. We identified three clusters of participants based on their responses on sleep-related variables. One exhibited a somewhat erratic sleep pattern with a relatively high frequency of nocturnal awakenings and diurnal naps and a lower overall sleep quality. This cluster also reported a high dream recall frequency. Dream recall was also a main characteristic that distinguished the other two clusters, although there were smaller yet statistically significant differences in most of the measured sleep variables. The results showed that, controlling for demographic variables, participants in the “erratic” cluster reported the highest PD frequency and those in the low dream recall cluster reported having PDs least often. This was further supported by the finding that the presence of a sleep disorder diagnosis was a significant predictor of PD frequency.

Finally, we hypothesised a relationship between PD experience and sleep medication use. We found that participants who used sleep medication in the past reported a higher frequency of PDs than those who never used it. Furthermore, those in the "erratic" sleep cluster were more likely to have used sleep medication then participants in the other two clusters. This validates our interpretation of the extracted clusters since it can be expected that people with disturbed sleep are more likely to use sleep medication. However, the findings suggest that sleep medication use has an additive effect beyond that of the sleep clusters.

These results are consistent with the hypothesis that PD experience may arise as a result of an individual's processing of external stimuli during borderline sleep states (Alcock, 1981). An erratic sleep pattern and associated increased likelihood of sleep medication use means more frequent hypnagogic and hypnopompic states and thereby a heightened likelihood of external stimuli being processed. Such stimuli can then figure in the narrative of one's dreams. If one is then confronted again with the same stimuli after awakening, this can lead to the impression of precognition.

Alternatively, given that the present study employs self-report measures, it is also possible that these results reflect a tendency of certain people to exaggerate their sleep difficulties and over-report extraordinary experience. If so, one would expect to find a relationship between PD experience and variables such as anxiety, depression, or narcissism. To the best of our knowledge, there has been only one study into the role of neuroticism in PD frequency and it did not find a significant result (Schredl, 2009). As for the other traits, there appears to be no research linking them to PD experience. More research on this topic is therefore needed. Exploring the aforementioned variables could help to adjudicate between the two interpretations of the link between PD experience and sleep characteristics.

There are some limitations to our findings. Firstly, the sample used in the study may not be representative of the general population and was not obtained using random sampling. However, an effort was made to recruit a broad range of participants of differing backgrounds and beliefs. However, the sample may nevertheless have been biased. There was, for instance, a preponderance of males in one of the sleep clusters, despite males being slightly underrepresented in the sample as a whole. Since the cluster in question included the most disbelievers in PDs, this gender distribution may reflect the fact that some of the strong disbelievers were recruited via online forums dedicated to scepticism. These forums tend, in general, to be rather male-dominated. Moreover, using online forums and interest groups dedicated to the paranormal may have led to overrepresentation of PD believers/experiencers in comparison to the general population. Thus, the frequency of PD belief and experience in our sample should not be viewed as representative of the distribution of these variables in the general population.

As noted above, there are relationships between PD belief, experience and their correlates, whose nature remains unclear. Further research should clarify the issues identified here. Especially welcome would be the employment of longitudinal design and the inclusion of personality and psychopathology measures. Exploring differences in individuals' attitudes towards their PD experiences could also provide novel insights into the psychology of these experiences.

In conclusion, the present study identified several correlates of PD belief and experiences, some of which had not been previously explored. The main findings are that PD experience is negatively related to education and that a higher frequency of PDs is associated with somewhat erratic sleep patterns and a heightened likelihood of sleep medication use.

Further research in this field is highly encouraged since, in light of the often inconclusive findings in the area of psychology of extraordinary beliefs and experiences, exploring the underlying mechanisms of specific phenomena seems to be the conceptually strongest strategy to elucidate why these kinds of beliefs and experiences remain so prevalent in the general population.

5. References

Agorastos, A., Metscher, T., Huber, C. G., Jelinek, L., Vitzthum, F., Muhtz, C., ... & Moritz, S. (2012). Religiosity, magical ideation, and paranormal beliefs in anxiety disorders and obsessive-compulsive disorder: a cross-sectional study. *The Journal of Nervous and Mental Disease, 200*(10), 876-884.

Alcock, J. E. (1981). *Parapsychology: Science or Magic?* Oxford: Pergamon.

Auton, H. R., Pope, J., & Seeger, G. (2003). It isn't that strange: Paranormal belief and personality traits. *Social Behavior and Personality: an international journal*, *31*(7), 711-719.

Beaulieu-Prévost, D., & Zadra, A. (2005). Dream recall frequency and attitude towards dreams: a reinterpretation of the relation. *Personality and Individual Differences*, *38*(4), 919-927.

Bender, H. (1966). The Gotenhafen case of correspondence between dreams and future events: A study of motivation. *International Journal of Neuropsychiatry, 2*, 398-407.

Buysse, D. J., Reynolds III, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Research, 28*(2), 193-213.

Deary, I. J., & Johnson, W. (2010). Intelligence and education: causal perceptions drive analytic processes and therefore conclusions. *International Journal of Epidemiology*, *39*(5), 1362-1369.

Dudley, R. T. (2000). The relationship between negative affect and paranormal belief. *Personality and Individual Differences*, *28*(2), 315-321.

French, C. C., & Stone, A. (20134). *Anomalistic psychology: Exploring paranormal belief and experience*. Palgrave Macmillan.

French, C. C., & Wilson, K. (2007). Cognitive factors underlying paranormal beliefs and experiences. In S. Della Sala (Ed.), *Tall tales about the mind and brain. Separating fact from fiction* (pp. 380-398). Oxford: Oxford University Press.

Haraldsson, E. (1981). Some determinants of belief in psychical phenomena. *Journal of the American Society for Psychical Research, 75*(4), 297-309.

Haraldsson, E. (1985). Representative national surveys of psychic phenomena. *Journal of the Society for Psychical Research, 53*, 145-158.

Hoelscher, T. J., Klinger, E., & Barta, S. G. (1981). Incorporation of concern-and nonconcern-related verbal stimuli into dream content. *Journal of Abnormal Psychology*, *90*(1), 88-91.

Liberali, J. M., Reyna, V. F., Furlan, S., Stein, L. M., & Pardo, S. T. (2012). Individual differences in numeracy and cognitive reflection, with implications for biases and fallacies in probability judgment. *Journal of Behavioral Decision Making*, *25*(4), 361-381.

Pagel, J. F., & Helfter, P. (2003). Drug induced nightmares—an etiology based review. *Human Psychopharmacology: Clinical and Experimental*, *18*(1), 59-67.

Pagel, J. F., & Parnes, B. L. (2001). Medications for the treatment of sleep disorders: an overview. *Primary Care Companion to the Journal of Clinical Psychiatry*, *3*(3), 118.

R Core Team (2012). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL http://www.R-project.org/.

Rattet, S. L., & Bursik, K. (2001). Investigating the personality correlates of paranormal belief and precognitive experience. *Personality and Individual Differences*, *31*(3), 433-444.

Ritchie, S. J., Bates, T. C., Der, G., Starr, J. M., & Deary, I. J. (2013). Education is associated with higher later life IQ scores, but not with faster cognitive processing speed. *Psychology and Aging*, *28*(2), 515.

Roe, C. A., & Morgan, C. L. (2002). Narcissism and belief in the paranormal. *Psychological reports*, *90*(2), 405-411.

Schredl, M. (2009). Frequency of precognitive dreams: Association with dream recall and personality variables. *Journal of the Society for Psychical Research, 73*(2), 91-90.

Sharps, M. J., Matthews, J., & Asten, J. (2006). Cognition and belief in paranormal phenomena: Gestalt/feature-intensive processing theory and tendencies toward ADHD, depression, and dissociation. *The Journal of Psychology*, *140*(6), 579-590.

Stanovich, K. E., & West, R. F. (2008). On the relative independence of thinking biases and cognitive ability. *Journal of Personality and Social Psychology*, *94*(4), 672.

Tobacyk, J. J., & Mitchell, T. E. (1987). Out-of-body experience status as a moderator of effects of narcissism on paranormal beliefs. *Psychological Reports*, *60*(2), 440-442.

Valášek, M., Watt, C., Hutton, J., Neill, R., Nuttall, R., & Renwick, G. (2014). Testing the implicit processing hypothesis of precognitive dream experience. *Consciousness and Cognition*, *28*, 113-125.

Ward, J. H., Jr. (1963). Hierarchical grouping to optimize an objective function. *Journal of the American Statistical Association, 58*, 236–244.

Watt, C., Ashley, N., Gillett, J., Halewood, M., & Hanson, R. (2014). Psychological factors in precognitive dream experiences: The role of paranormal belief, selective recall and propensity to find correspondences. *International Journal of Dream Research, 7*, 1-8.

Watt, C., Wiseman, R., & Vuillaume, L. (in press). Dream precognition and sensory Incorporation: A controlled sleep laboratory study. *Journal of Consciousness Studies*.

West, R. F., Toplak, M. E., & Stanovich, K. E. (2008). Heuristics and biases as measures of critical thinking: Associations with cognitive ability and thinking dispositions. *Journal of Educational Psychology*, *100*(4), 930.

Wiseman, R., & Watt, C. (2006). Belief in psychic ability and the misattribution hypothesis: A qualitative review. *British Journal of Psychology*, *97*(3), 323-338.